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The Survival of the Liberal Arts College

EARL J. McGRATH

The Role of Data Processing

RALPH C. M. FLYNT

Teachers in Engineering, Mathematics, and Physical Sciences

CLARENCE B. LINDQUIST

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE—Office of Education

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The Survival of the Liberal Arts College

By EARL J. McGRATH*

IN 1876 Daniel Coit Gilman, when he was inaugurated as the first president of Johns Hopkins University, said, "I see no advantage in our attempting to maintain the traditional 4-year class system of the American colleges." This and other similar statements by Charles W. Eliot, David Starr Jordan, and Nicholas Murray Butler predicted and urged the disestablishment of the 4-year liberal arts college.[1] If these past dismal predictions about the future of the liberal arts college had been realized, this most tenacious unit in our educational enterprise would long since have passed from the American scene.

Ever since the early 19th century when American educators fell under the spell of the German philosophy and practice of higher education, proposals have been made which would have broken the college into pieces, or so reshaped it as to have made it into an entirely different institution. As the advocates of these various proposals were among the most serious thinkers and most forceful leaders in American higher education, the failure of their plans only reinforces the view that the liberal arts college persists because it serves an indispensable function in our society.

The liberal arts college not only continues to thrive but pours, in an even greater stream than in our earlier cultural life, its richly nourishing blood into the entire body of higher education. No student of the other units in the higher education organization can escape the conclusion that even though the professional schools and the graduate divisions of the universities have gained increasing strength and autonomy, they nevertheless would wither if they were not sustained by the high quality of education their students receive in the liberal arts colleges. The increasing demands of the former on the latter insure the future of the colleges. The interest now being shown by the British in this peculiarly American institution attests to the worth of our own brand of liberal arts education, and the likelihood of its indefinite survival. In recent months a 3-day Anglo-American meeting held at Ditchley House, Oxford, discussed the social, economic, and educational philosophy which animates the programs of American liberal arts colleges and the offerings shaped by this philosophy to satisfy the individual and social requirements of a dynamic democratic society.

Moreover, the sheer increase in the college-going population will provide any reputable liberal arts college, and probably some of only modest reputation as well, with adequate patronage in the years ahead to insure survival. The elaborate statistical data on enrollments need not be reviewed here, nor the validity of the generalizations drawn from them appraised. Even allowing for an improbably large margin of error, there will be over the next 10 years more prospective students than most colleges can accommodate. In fact, the success of entirely new colleges in filling their available facilities permits bright forecasts concerning future enrollments. Even though an increasing number of young people will attend professional schools of engineering, journalism, business administration, education, and the like, the liberal arts colleges will not want for an adequate student body. And if some privately financed

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[1] For a full historical treatment of the subject, see William H. Cowley, "A Ninety-Year-Old Conflict Erupts Again," *Educational Record*, Vol. XXIII, 1942 pp. 192–218.

institutions encounter nsupportable financial burdens, their services will be recognized to be of such indispensable social value that they will immediately be sustained from the public treasury—as a few have already been.

As a physical entity the future of the liberal arts college cannot be doubted. Hence, the questions demanding the serious consideration of all thoughtful Americans interested in this institution do not relate to its corporate survival but rather to its future character and quality. The past of the liberal arts college, like that of all other social institutions, sheds light on its probable future.

If forecasts are to be made, three characteristics of liberal arts colleges require exposure and analysis. All three features can be observed in the recent development of all such institutions, though in varying degree depending upon local traditions, clarity and firmness of objectives, and the character of particular clienteles. These three developments of the programs and purposes of liberal arts colleges can be tersely described in the following terms: (1) They have increasingly added vocational courses to their offerings, (2) they have recently narrowed and specialized their curriculums, and (3) in a concern for excellence they have become more selective in their admissions standards. Although in individual institutions exceptions can be found to each of the generalizations and a few can be said to be reversing these trends, the conclusions are valid for a large majority of liberal arts colleges. Since the character of their instruction, the quality of their faculties, the range of their services to American society, indeed their very financial health, will all depend in one way or other on the continuance or discontinuance of present trends in these three respects, they deserve critical analysis and appraisal. This is a propitious time to make both, because with the impending superfluity of students institutions will no longer be forced to shape their programs according to extramural economic and social forces.

Increase in Vocational Programs

Consider first the increased vocational courses in the curriculum. It is impossible here to review the historical changes which have occurred in the idea of liberal education since the days of Plato and Aristotle.[2] Considering recent curricular trends, it can be said, however, that the disintegration of the standard liberal arts curriculum in the late 19th century, accompanied by the steady introduction of new subject matter in the natural sciences, the humanities, and the arts, was quickly followed by irresistible demands for instruction with a more "practical" purpose. After the turn of the century, and especially after World War I, faculties admitted to the liberal arts curriculum a host of new occupationally oriented courses of study. Today hardly a college in the country fails to offer some instruction of this type, especially in such fields as elementary and secondary teaching, business administration, music, and journalism, and many institutions offer additional programs in medical technology, nursing, speech therapy, and other specialized instruction preparatory for admission to schools of medicine, dentistry, engineering, and social work.

Two questions can be raised in connection with these vocational programs. Do they so distort the purposes of the institution that they prevent students from receiving a genuinely liberal education, and do they so dissipate the institution's resources that the general quality of the educational program inevitably falls. If these questions are answered affirmatively, another immediately follows: What should be the policies of the colleges with respect to such instruction? The first question cannot be answered categorically. What is broadly liberal and what is narrowly vocational depends to a great extent on the content of the course and the attitudes and skills of the teacher. The history of education, accounting, and music theory can be more liberalizing than elementary Latin, the history of the United States, and the calculus if the former are well, and the latter poorly, taught, and vice versa. But assuming that courses with a clear career goal emphasize general principles and critical analysis rather than detailed facts and how-to-do-it techniques, and if the proportion of such instruction in the total 4-year undergraduate experience is reasonable, then the legitimate purposes of liberal education need not be perverted.

Many old and respected colleges have included semiprofessional majors among their offerings and have prevented overspecialization and a consequent impoverishment of the students' general education

[2] Those who wish to trace the evolution of the conceptions of education in the liberal arts and sciences will find a fuller exposition of the subject in *Liberal Education and the Professions*, by Earl J. McGrath, and *Are Liberal Arts Colleges Becoming Professional Schools?* by Earl J. McGrath and Charles H. Russell.

by limiting to the customary major of 30 hours the amount of such instruction which may be counted for a degree. With such restrictions, and with suitable requirements in other disciplines to insure breadth of learning, many liberal arts colleges will properly continue to offer programs leading to immediate gainful employment in appropriate careers. Under these conditions the graduates of such courses will be no less liberally educated than their classmates who concentrate in the conventional liberal arts subjects. One type of specialization merely takes the place of another.

Whether the offering of these programs with a vocational goal imposes an indefensible, and, in the long run, a destructive, economic burden on available resources again depends upon other institutional factors. Two of the most important of these are the total enrollments of the college and the number of specialties offered. The dropout rate in many colleges between the freshman and senior year runs as high as 40 or 50 percent. If the initial enrollment, therefore, is low (200 freshmen), and the number of majors offered is high (25 to 30), the classes in advanced subjects must necessarily be small. They must then also be expensive in terms of faculty energy and compensation. Those colleges which decide to continue to offer specific vocational preparation, even though this instruction can be educationally justified, will be well advised to limit the number of such programs in accordance with their ability to attract large enough enrollments to make them economically feasible. Some institutions in launching 15 or 20 such programs have apparently labored under the illusion that the resultant increases in enrollments were an economic asset, when actually the reverse is true. Unless they have unusually large endowment income, few colleges can afford to split their majors among 30 or 40 specialties. If they do so without large resources, the advanced classes are small, the teaching loads become unduly heavy, salaries remain unattractively low, and the general quality of education drops commensurately. Even though a liberal arts college survives under these circumstances, it will not be the kind of institution needed to serve the pressing needs of American society.

Specialization

A second evolving characteristic of the educational program in liberal arts colleges is the increasing specialization in the various branches of learning. The standard 30 or 40 courses in the classics, mathematics, philosophy, and religion of the early 19th century have now expanded and splintered into hundreds of instructional units, many of which embrace the advanced, highly specialized subject matter characteristic of the graduate schools. The extent and results of this proliferation of courses are revealed in a study by the Institute of Higher Education reported in *Memo to a College Faculty Member*. The findings in this inquiry show that departmental offerings vary greatly, but with little relationship to the declared purposes of the institution, the number of students served, or the resources available to support the program. The drain on the institutional treasury has often been inexcusable in terms of the results achieved. Moreover, on the basis of justifiable criteria, it has been demonstrated that departments with high quality but modest offerings serve both nonmajor and major students as well as others with a large range of subjects.

This multiplication of unneeded courses, which dissipates the institution's resources and often narrows the undergraduate's education through premature and excessive specialization, has unfortunately been recently accompanied in some institutions by an abandonment or an emasculating limitation of their general education requirements. Thus far, the backtracking on what 10 years ago were avenues leading to a fuller, broader general education has been largely limited to the larger institutions such as Chicago, Columbia, and Minnesota. But since they initially set the pattern for a more comprehensive liberal education, later adopted in various forms by the smaller liberal arts colleges, the latter may again follow suit.

Moreover, advanced placement practices and other policies which encourage the beginning of specialization even as early as the high school years add further support to the view that though the liberal arts college may survive and flourish, it may no longer perform its traditional, distinctive function of providing a broad preparation for the competent discharge of the varied responsibilities of life in a democratic society. Some colleges already seem to be transforming themselves, perhaps unwittingly, into specialized preparatory schools for the professional and graduate divisions of universities.

At the moment it is difficult to establish trends in the various curricular patterns now developing.

In some institutions like the Montieth College at Wayne State University, Michigan State University—Oakland, the University of South Florida, and Raymond College at the University of the Pacific, the curriculum clearly reveals the faculties' determination to perpetuate the traditional values of a broad liberal education. In other places, however, especially since the need has become putatively demanding for earlier and more intense specialization to match the practices of higher education in Russia, faculties seem to be abandoning their recent concern for the liberal objectives of undergraduate education in favor of specialized training. The policies adopted generally by faculties with respect to the amount of specialization they permit and the breadth of intellectual experiences they require will in the end determine whether the liberal arts college per se survives.

The Concept of Excellence

Lastly, the manner in which colleges construe the term "excellence" will, to a degree, determine whether they will have a pervasive liberalizing influence on our society. Through the years since the founding of the Republic the liberal arts colleges have served the needs of a broad selection of American youth. Little reliable evidence exists respecting early admissions practices, but there can be no doubt that with few exceptions they were flexible and latitudinal. Moreover, though we lack carefully designed studies of the relationships between academic ability and success in postcollege life, the biographies of many men and women who, in our national history, have risen to positions of high status and large responsibilities suggest that even those with only modest academic records can profit from a liberal undergraduate education. But many undergraduate institutions which earlier served students with a wide variety of abilities and skills have been steadily raising their admission standards and thus limiting their student bodies to upper ability levels, or stated in another way, their traditional constituencies are being changed.

This shift in the students they attempt to serve will also determine the future of the liberal arts colleges. Everyone will agree that they should aim at attracting their proper share of the upper ability groups, the top 10 or 15 percent of high school graduates about which so many educators are now concerned. Unfortunately, however, 85 or 90 percent of graduates will not stand in the exclusive 10 or 15 percent, and even among the latter group many will not attend liberal arts colleges at all but will enter undergraduate professional schools. Moreover, a growing body of evidence suggests that the highly selected student body includes a significant number of noncreative routine thinkers and that many of the lower level students, on the contrary, possess real talent and imagination which, nurtured by good teaching, can raise their possessors into high levels of personal and social accomplishment.

Furthermore, the concept of excellence needs critical reexamination before it is indiscriminately applied to the enterprise of liberal education. Though the facts are too limited to permit broad generalization, many students of the enterprise of higher education have concluded that excellence is being too narrowly conceived. Too often it refers solely to institutional practices which lead to the admission of those who have obtained high scores on subject-matter tests, whose primary values stem from the acquisition of knowledge too frequently limited to a narrow field of scholarship, and who intend to enter the academic life. This conception completely overlooks or deliberately disregards whole spheres of human action and conduct. Perhaps in a technical training institution or graduate school this preoccupation with the mastery of large bodies of fact with little concern for the broader aspects of living can be condoned, but a liberal education without a humanistic orientation and a concern for the ends of living rather than the means is a contradiction in terms. Hence, the future of the liberal arts college will be determined by its continuing concern for the education of a considerable percentage of American youth (not the top 10 percent alone) in the values, the ideals, the human traits which through the centuries have formed the basis for, and the objectives of, western culture, and it may be added to a great extent of other cultures as well. The liberal arts college which makes a more discriminating judgment than is now common with regard to all the qualities required to live a personally satisfying and socially useful life and bases its admission standards, its curricular offerings, its teaching practices, and its graduation requirements on these qualities will in the fullest sense be meeting defensible criteria of excellence.

This discussion of the prospects for the survival

Continued on p. 22

The Role of Data Processing

By RALPH C. M. FLYNT*

DATA PROCESSING is not exactly new: it probably began as soon as man evolved a number system and learned to use a notched stick or a sand table. Modern data processing in education, however, is quite new. While it still involves numbers, it embodies all the complexities of an elaborate *system*, composed of subsystems and auxiliary systems. This complexity—with all the attendant problems of standardization, coordination, investment in equipment, training of personnel, financial support, professional cooperation, and the like—is the price we pay for the comparability, speed, and true economy of a modern data system in education.

It is not my function or purpose to enter into a lengthy description of data processing. Nevertheless, I feel that I must emphasize very briefly five factors which *must* be recognized and accepted if there is to be any successful modern data processing in education at all.

First is the factor of language. The Federal Union of the United States includes 50 States; but we cannot work with 50 different languages. Unlike the denizens of the hundreds of islands of Polynesia, each with its own language, we in the United States all speak standard American (with only minor or insignificant local variations if the southern accent can be so regarded). In education, too, we must develop a common technical language. This is standardization—not for the sake of uniformity as an ideal, but for the sake of utility and economy. Where hampering differences occur, conferences must be called to develop consensus. The Office of Education, in cooperation with many educational organizations, is steadily engaged in developing a set of handbooks which will reflect and codify a common language as a basis for educational statistics and educational data processing.

Second, we must be concerned with the unit of information. It is best, for most purposes, if the unit is small. Thus, the child is usually a better unit than the class; the school district is a better unit than the State; the individual college department is a better unit than the college or the entire State college system. Actually, there is some difference here between the needs of administration and research. Many administrative purposes tolerate or may require rather large units (such as a county or an entire college); research purposes generally require finer units. But good administration also includes research; and research should not ignore administrative units; so the difference is not as great as may first appear. Let me put it this way: you can develop data for the larger units from the smaller; but can rarely extract data for the smaller, if you start with the larger.

Third is the matter of machinery. Obviously, modern machinery is essential. This includes machinery for the *transcription* of data (e.g., machines which transcribe typed numbers into holes in a card), and for the *communication or transmission* of data (e.g., Teletype and Dataphone), as well as machinery for data processing as such.

Fourth is the human factor. Unless there is understanding, acceptance, and cooperation all up and down the line, from the local superintendent to the teacher, from the teacher to the pupil and his parents, and from the local superintendents or college officers to the State officials and the Office of Education, the system won't work as it should.

Fifth and finally is the economic factor. Fortunately, we can well afford what the system costs, in order to get the speed and true economy which the system permits.

*Associate Commissioner for Educational Research and Development, U.S. Office of Education. The article, reflecting the concern of the Office of Education for information gathering and retrieval, is adapted from a speech delivered by Mr. Flynt at the Wisconsin Institute on Data Processing in Education, University of Wisconsin, Madison, Wis., on Aug. 5, 1963.

I should like to emphasize that modern data processing in education is not, at its best, a purely local affair. Standardization of language cannot be local; agreement on the units of information calls for nationwide cooperation; the machinery employed will be national or even international in its capacity; and so on. Local, State, and National purposes can all be served simultaneously by modern data processing in education. *None* of these purposes can be served efficiently and well unless *all* are served together.

What, now, is the role of modern data processing in education? The proper role, it seems to me, is twofold: first, as that of a servant; and second, as that of a taskmaster.

As a servant we expect modern data processing to accomplish what we have been doing, but to accomplish it faster, more accurately, and with greater flexibility as to possible use of the data. We also expect the total costs to be less; but even if the new costs were somewhat greater than the old, the gains in speed and accuracy and flexibility would be well worth it. Perhaps a word of caution is required here. We don't need, in education, the same kind of speed that is needed by the military or by space research projects. Speed does cost money. In general, we must be faster than we have been; but a rule of reason must be applied to the amount of money that we spend for speed alone.

THE FIELDS of application of modern data processing in education are numerous. Let me mention five that seem of commanding importance:

1. *Local operations.*—This refers to such tasks as personnel accounting, financial accounting, property accounting, scheduling of courses and examinations, allocation of instruction rooms. The recordkeeping chores of individual teachers can be limited to reporting the original, basic data; sums, subclassifications, and the like can be left to the machines. Vocational and educational guidance of students can be based on combinations of test scores, school grades, or other standard information which is, so to speak, ground into machines; the machines can provide answers that are finally interpreted in the light of the total situation by the individual counselor and his client.

2. *Administration.*—Everyone has his own ideas as to the duties of administration, but perhaps we can all agree that school and college administration involves an audit of what is going on and also plans for the immediate and distant future. The auditing activity is ordinarily dependent, among other things, on statistical reports regarding attendance, dropouts, space utilization, books circulated (or uncirculated), correspondence between teaching assignment and teaching specialty, cost per bus-mile, and so on. The planning activity is also based on compilations of data, some routine and some special or ad hoc. What is sometimes not fully appreciated is the highly quantitative nature of many of the typical administrator's decisions. *How many* new students will there be in the entering class next fall? *How much* money should be allowed for new books and equipment? Just *when* will new bonds be needed for new construction? *How many* very small college classes can be permitted? What *rate* of salary advance should be planned or established for the future? For all these quantitative questions, quantitative data are essential as the background, if not the basis, for the decisions. And the data must become available reasonably fast, be as accurate as possible, and be comparable with data from other districts or States or colleges. Only a modern data-processing system is likely to fulfill these requirements.

3. *Research.*—In education, two different types of research prevail: one, "institutional research"; the other, without any distinctive designation, may be termed "generalized" research (in the sense that the findings are less restricted as to application). Not infrequently, institutional research is conducted entirely within the framework of regular, institutional data. If these data are maintained in modern, machine-usable form, the advantage to research is crucial: it commonly makes the difference between being able to use the information vs. not being able to use it. In all research (both institutional and general), a modern data-processing system will supply a rich background of information in small units; *such* information can readily be studied in relation to other, ad hoc data with minimum cost and maximum speed. Modern data processing also provides machinery which can handle tremendous amounts of data extremely rapidly. This means that more caculations can be performed, more cross-classification studied, more leads explored. The gains to research are obvious.

4. *Information retrieval.*—The searching of bibliographies, abstracts, and library catalogs for perti-

nent information is typically quite slow and expensive. The hope of the future is that information-retrieval systems can be developed which will meet three requirements: (1) moderate operating costs; (2) high speed; and (3) high selectivity, so that only a *minimum* of related but unessential material is selected.

5. *Public relations.*—It is a truism that education in a democracy cannot prosper without public understanding and support. The kind of specific, detailed information made readily available by a modern data-processing system is most helpful for the development of good public relations. Thus, data can be supplied on such items as the cost per pupil for books, for bond interest, for instructional salaries. Whether low or high, the specific, detailed figures provide a basis for discussion and understanding that gross figures can never achieve. Furthermore, the flexibility of the data in a modern system is such that, virtually overnight, answers to unexpected questions can be obtained. This is an invaluable advantage.

National Science Foundation

Deadlines for NSF Fellowships

December 16, 1963, is the application deadline for regular postdoctoral fellowships awarded by the National Science Foundation, and January 3, 1964, is the deadline for applications for graduate fellowships for academic year 1964–65.

NSF will award approximately 185 postdoctoral fellowships to persons planning to enter or continue postdoctoral study in the sciences. Applicants must be U.S. citizens or nationals and must have earned a doctoral degree in a science field or have had research training and experience equivalent to that represented by such a degree.

NSF will award approximately 4,000 graduate fellowships for master's or doctoral degree study in science. Applicants will be required to take the Graduate Record Examination, to be given on January 18, 1964, at designated centers in the United States and foreign countries.

For further information, write to the Fellowship Office, National Academy of Sciences-National Research Council, 2101 Constitution Avenue NW., Washington, D.C., 20418.

IN THE FIVE areas that have just been considered—local operations, administration, research, information retrieval, and public relations—modern data processing has proved a useful servant. It has also proved to be something of a beneficent taskmaster. In general, a modern data-processing system will not work unless certain desirable conditions are fulfilled. These conditions ought ideally to be fulfilled in any system. But modern data processing tends to *enforce* fulfillment, by the penalty exacted if the conditions are *not* fulfilled. Specifically, modern data processing places a premium, first of all, on *advance planning:* as to *what* data are to be collected, *when* to collect, *how much* to collect (size of sample, number of variables, number of checks), and *what is to be done* with the data after collection (what tabulations, what cross-classifications, what calculations). Second, modern data processing requires that the data fed into the machines should be as free as possible of error. This leads to greater care in the standardization of definitions and classifications, greater care in the development and application of measurement devices, greater scrutiny of the original data prior to transcription onto punched cards or magnetic tape, and generally to higher standards of operation throughout.

Rather obviously, the data-processing machines, despite their remarkable power, cannot do the whole job. Determining the questions to which answers are sought, verifying and correcting certain aspects of the original data, the writing of directions or "programs" for the machines, and numerous other elements of the total process of planning and execution—all these call for personal attention and judgment, with controls both at central headquarters and in the field. In brief, no data system can be purely and simply mechanical. Basically, the human aspects remain the most important, by far. But at present what is most needed is to take advantage of the new opportunities offered by the remarkable advances in data-processing technology.

Of course, modern data-processing systems have their handicaps or dangers. Uneasiness has been expressed lest a system become master instead of servant; lest a system, once developed, acquire such rigidity that it cannot be changed; lest the system tend to give priority to statistical or mechanical considerations, rather than educational; and lest the flow of information tend to be unidirectional from lower echelons to higher.

There is doubtless some truth to these charges. The answer is, I think, that any system can become master instead of servant, and can lead to undesirable effects, if it is not competently administered. Here,

as in other respects, high standards are required to make modern data systems work satisfactorily. The selection of personnel to develop and control a modern data-processing system must be as careful and thoughtful as the development of the machinery itself.

IN CLOSING, let me share with you the plans or hopes of the Office of Education in this field of modern data processing. We regard the hardware or machinery of data processing only as a tool: but a *new* tool; and a tool so powerful as to require that we rethink our whole program in the light of this new development.

Perhaps most obviously, the new tool permits us to handle a larger volume of data, and thus to undertake larger studies. As a specific example, the Office of Education has completed a study of 10,000 new or beginning teachers, has participated in the planning of a study of an equal number of graduate students, and now is preparing to launch a survey of physical facilities in about 15,000 school plants. All these are studies of samples drawn from much larger universes.

One hears a great deal nowadays about the efficacy of small samples; but small samples, in general, do not permit of subclassification and cross-classification, and really are pretty useless, *unless* the study is focused on *one* measurement only, and no analysis is contemplated. Thus, a very small sample might permit us to estimate the number of college students enrolled in the United States. But such a sample would not yield reliable figures as to the enrollment in each State, the number of full-time vs. part-time students, the number in 2-year vs. 4-year institutions, the enrollment in the various fields of specialization (mathematics, physics, chemistry, engineering, medicine, religion, etc.)—to say nothing of cross-classification among these various factors. Thus large-scale studies are essential; and the ability economically and rapidly to handle data from large samples is a very important gain, of which we are taking advantage.

But we have a more radical plan and expectation with regard to the principal type of surveys conducted by the Office of Education. As you know, much of the data collected by the Office come from institutions, rather than individual persons as such; that is to say, from schools, colleges, libraries, State departments of education, and so on. The information reported is generally based on *data of record*—relating to such items as enrollment, graduates, staff, income, expenditures, property, or course offerings. Where unit records are maintained, it is our thought that mechanically or photographically prepared *copies* of these records be sent to the Office of Education: either directly, or through an appropriate agency such as the State departments of education. In most cases, the records will be punched cards, which can be very inexpensively reproduced. In small institutions the records may be on 4 by 6 cards, in alphabetical lists, and the like; in such cases, an inexpensive photographic reproduction is possible. The Office of Education would hope to receive copies of the records *routinely;* and from the records, could obtain the data needed to prepare our statistical reports. In this way, the institutions would be relieved of the task of answering our questionnaires; and the Office of Education would also benefit, since availability of the original data would open opportunities for statistical analysis which at present are missing.

All this is not just a dream. Right now we are arranging for the receipt, from State departments of education, of the records on certificated teaching personnel.

Of course, a great deal of spadework remains to be done. A data-flow system such as is planned for certificated teaching personnel cannot work well unless data are standardized at the source; and this is quite a severe requirement. But we think that the kind of national data-flow system contemplated—where data flow, with minimum burden on all concerned, from local to State and national agencies—can be accomplished: with gains in speed and accuracy, and with reduction in costs. Perhaps the most important gain, however, is the deeper and more extensive research that will be made possible through the availability, in one place, of detailed, standardized, original data. The research opportunities thus opened up seem to me to be no less than thrilling.

I HAVE sketched modern data-processing systems in the role of servant, taskmaster, and in the end, as some sort of statistical genie. To be sure, there are dangers and pitfalls, as well as opportunities and far horizons; and there is much to be done. What will develop in the future depends less on the machinery than it does upon us.

College Teachers in Engineering, Mathematics, and Physical Sciences: Supply and Demand

By CLARENCE B. LINDQUIST*

THE PRESIDENT'S Science Advisory Committee [1] has recommended that efforts be made to increase the number of doctor's degrees earned annually in engineering, mathematics, and the physical sciences from about 3,000 in 1960 to 7,500 in 1970 and the number of students who complete a full year of training in these subjects from 12,000 to 30,000 in this period. (The committee report designated the three fields collectively as EMP.) The committee believes these to be necessary and achievable goals.

Responsibility for much of the effort will fall on the graduate schools of the country: they will be called on to increase the number of students they prepare at the graduate level. There is, of course, no question about their response: they will make every effort to achieve the goals set. But successful achievement will very likely require both increased number of faculty members in EMP and increased productivity in the number of graduate degrees per faculty member. In this article, however, I am concerned only with the prospects of increasing the number of faculty members in EMP. This task is in itself formidable as I hope to show in a discussion of the supply and demand for college teachers.

Staff Members in Colleges and Universities

On March 1, 1961, approximately 76,400 (60,700 in full-time equivalents) engineers, mathematicians, and physical scientists were employed in colleges and universities in the aggregate United States (see table 1). These figures include faculty members, graduate students, and other professional staff members (those who do not hold faculty status).[2] Of the 60,700 full-time equivalents employed, about 36,000 were engaged in teaching and about 24,700 in research and development and other activities.

Table 1.—Number and full-time equivalents of employed engineers, mathematicians, and physical scientists in all colleges and universities, Mar. 1, 1961

Field	Head count			Total full-time equivalents
	Total	Full time	Part time	
Engineering	27,300	18,600	8,700	22,400
Mathematics	14,800	9,500	5,300	11,700
Physical sciences	34,300	20,500	13,800	26,600

Source: National Science Foundation, Reviews of Data on Research and Development, No. 37, January 1963. (NSF 63–4)

Although some persons with only a bachelor's degree have served as college teachers for many years, a master's degree is commonly regarded as the minimum academic preparation for a college teacher, and other factors being equal, a doctorate is preferred. At the graduate level of teaching a doctorate is almost a necessity.

College teaching must compete with industry,

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[1] *Meeting Manpower Needs in Science and Technology, Report Number One: Graduate Training in Engineering, Mathematics, and Physical Sciences*, a Report of the President's Science Advisory Committee, Dec. 12, 1962. U.S. Government Printing Office. 20 cents, 45 p.

[2] *Science and Engineering Professional Manpower Resources in Colleges and Universities, 1961*, Reviews of Data on Research and Development, No. 37, U.S. Government Printing Office, January 1963. 12 p. 15 cents.

business, and government for its share of persons with high-level academic training. For this reason, from the point of view of supply, it is instructive to examine the numbers and percentages of degrees granted at each level for selected years (see table 2). The years 1949–50, 1954–55, and 1959–60 are included because they represent 5-year intervals and the years 1960–61 and 1961–62, because of their current pertinence. To serve as a reference base, degrees in all fields of study are likewise shown. Data for other years and also for specific physical sciences are reported in *Degrees in the Biological and Physical Sciences, Mathematics, and Engineering: 1949–50 Through 1959–60.*[3]

Although both the number and the percentage of bachelor's degrees in engineering have decreased in recent years, both the numbers and percentages at the master's and doctor's level have greatly increased (see table 2). From 1959–60 to 1961–62 alone, the number of doctorates in engineering grew from 786 to 1,207, a 54-percent increase in 2 years.

The number of degrees in mathematics has been increasing substantially at all levels, particularly at the bachelor's and master's levels. In recent years the increase in the number of bachelor's degrees in mathematics has been greater than that in any other major discipline. The numbers of degrees in the physical sciences, on the other hand, have increased only moderately at the master's and doctor's levels,

[3] Clarence B. Lindquist, *Degrees in the Biological and Physical Sciences, Mathematics, and Engineering: 1949–50 Through 1959–60*, OE–54029, Circular No. 710, U.S. Government Printing Office, Washington, 1963. 35 p. 35 cents.

Table 2.—Degrees conferred, 1949–50, 1954–55, 1959–60, 1960–61, 1961–62: Aggregate United States

Year beginning July 1 and ending June 30—	All fields	Engineering		Mathematics		Physical sciences	
	Number	Number	Percent	Number	Percent	Number	Percent
	Bachelor's and first professional						
1949–50	433,734	52,722	12.2	6,392	1.5	19,653	4.5
1954–55	287,401	22,589	7.9	4,034	1.4	11,202	3.9
1959–60	394,889	37,808	9.6	11,437	2.9	17,133	4.3
1960–61	401,783	35,866	8.9	13,127	3.3	16,510	4.1
1961–62	420,485	34,735	8.3	14,610	3.5	17,040	4.1
	Master's and other second level						
1949–50	58,219	4,616	7.9	974	1.7	3,305	5.7
1954–55	58,204	4,484	7.7	761	1.3	2,602	4.5
1959–60	74,497	7,159	9.6	1,765	2.4	3,584	4.8
1960–61	78,270	8,178	10.4	2,238	2.9	4,043	5.2
1961–62	84,889	8,909	10.5	2,680	3.2	4,266	5.0
	Doctor's						
1949–50	6,420	463	7.2	160	2.5	1,473	22.9
1954–55	8,840	599	6.8	250	2.8	1,715	19.4
1959–60	9,829	786	8.0	303	3.1	1,839	18.7
1960–61	10,575	943	8.9	344	3.3	1,993	18.8
1961–62	11,622	1,207	10.4	396	3.4	2,122	18.3

Source: Annual reports, "Earned Degrees Conferred," of the U.S. Office of Education. The totals for the physical sciences include one-half of the degrees awarded in science, general program.

and failed to increase at all at the bachelor's level. As a percentage of all degrees at each level, the physical sciences have been losing ground at the bachelor's and doctor's levels.

Graduate Enrollments

Data on graduate enrollments in EMP in the fall of 1959,[4] 1960, and 1961 are significant because a good share of the new college teachers during this decade will come from these groups of students (see table 3).

Graduate enrollments in EMP have been increasing significantly in recent years. The rate of increase for the combined EMP fields has been greater than the rate of increase for the total number of students in all fields of graduate study. In mathematics the number of graduate students increased from 9,744 in the fall of 1959 to 12,671 in the fall of 1961, a 30-percent increase in 2 years.

More graduate students in engineering and in

[4] Fall 1959 was the first year for which these data were collected.

Table 3.—Enrollments for advanced degrees, fall 1959,[1] 1960, and 1961: Aggregate United States

Year: Fall	Total			1st-year students			Intermediate students [2]			Terminal-year students		
	Total	Full time	Part time	Total	Full time	Part time	Total	Full time	Part time	Total	Full time	Part time
	All fields											
1960	314,349	124,689	189,660	197,180	68,925	128,255	103,767	47,979	55,788	13,402	7,785	5,617
1961	338,981	132,674	206,307	217,492	72,645	144,847	108,506	52,257	56,249	12,983	7,772	5,211
	Engineering											
1960	36,636	14,698	21,938	19,894	7,996	11,898	15,226	5,809	9,417	1,516	893	623
1961	39,367	15,385	23,982	21,551	8,245	13,306	16,286	6,193	10,093	1,530	947	583
	Mathematics											
1959	9,744	4,157	5,587	5,610	2,335	3,275	3,729	1,597	2,132	405	225	180
1960	11,770	5,104	6,666	7,455	2,989	4,466	3,869	1,847	2,022	446	268	178
1961	12,671	5,817	6,854	7,851	3,234	4,617	4,325	2,260	2,065	495	323	172
	Physical sciences											
1959	23,517	13,245	10,272	10,383	5,639	4,744	10,773	6,079	4,694	2,361	1,527	834
1960	25,707	15,045	10,662	12,191	6,419	5,772	11,050	6,826	4,224	2,466	1,800	666
1961	26,553	15,783	10,770	12,245	6,528	5,717	11,741	7,431	4,310	2,567	1,824	743

[1] In the fall of 1959 there were 304,831 students enrolled for advanced degrees in all fields. Of these, 35,356 were enrolled for advanced degrees in engineering. The breakdown of these degrees into the categories indicated by the column headings is not available.

[2] Intermediate students are those who have completed at least 1 year of graduate study but are not in their last year. A student is designated as full time if the reporting institution regards him as carrying at least three-quarters of a normal full-time load of a graduate student.

Source: U.S. Office of Education "Summary Reports on Enrollment for Advanced Degrees."

mathematics were enrolled part time than full time; in the physical sciences more students were enrolled full time than part time. However, in all EMP fields the percentage of students enrolled full time was higher than the percentage of students enrolled full time in all fields of graduate study combined.

New Doctorates in Full-Time College Teaching

What happens to recipients of doctor's degrees after they receive their degrees? Fortunately, information on this subject, on a national basis, is now available. In his last three biennial studies of the supply of and demand for college teachers, Ray C. Maul of the National Education Association (NEA) includes information on the percentage of graduates going into college teaching in the year after they received their doctorates.[5] Table 4 gives the data for the three most recent reports, and these data are based upon most of the doctorates that were granted during the applicable years. The table excludes those in higher education service other than college teaching.

The difference between the percentage of new doctorates entering full-time college teaching from some other occupation or activity (see col. A) and the percentage entering or continuing full time in college teaching service (see col. B) represents the percentage who were full-time college teachers and who received doctorates and simply continued full-time teaching after the acquisition of their doctorates.

It will be noted that chemistry has the lowest percentage of doctoral recipients entering or continuing full time in college teaching service and that mathematics has the largest percentage, although persons highly trained in mathematics are increasingly in demand by industry and government.

Trends in Supply and Demand for New Full-Time College Teachers

The trends in the supply and demand of new full-time college teachers in recent years throws some light on the current supply and demand picture and prospects for the next few years. For this background information I am again indebted to the NEA reports. Dr. Maul's supply-and-demand studies have been limited to *new* full-time college teachers (persons who are devoting the major proportion of their time to teaching and who during the preceding year were not full-time college teachers at any institution), and until the 1957–58 and 1958–59 report were limited only to 4-year colleges and universities. Only the data referring to 4-year colleges and universities are used in this article. (Dr. Maul's studies also include information about junior colleges beginning with the 1957–58 report.)

The percentages are used here rather than the raw data from the NEA reports because the number of institutions increased considerably over the years: in the 1953–54 and 1954–55 study, 673 4-year colleges and universities reported, whereas in the 1961–62 and 1962–63 study 1,009 reported.

[5] There have been five research reports by the Research Division of the National Education Association on teacher supply and demand in colleges and universities, each report covering a 2-year period as follows: 1953–54 and 1954–55; 1955–56 and 1956–57; 1957–58 and 1958–59; 1959–60 and 1960–61; and 1961–62 and 1962–63. The last three reports include data on new doctorates going into college teaching.

Table 4.—Percentage of new doctorates in full-time college teaching service in the year following their degree

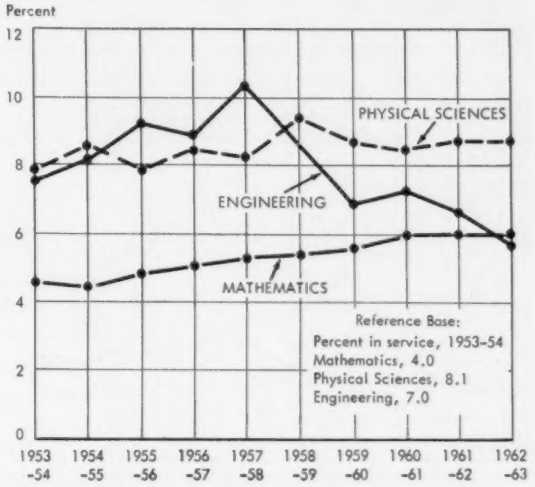
[Col. A—Percent entering college teaching from some other occupation; Col. B—Percent entering or continuing in college teaching service]

Year	All fields		Engineering		Mathematics		Chemistry		Physics	
	A	B	A	B	A	B	A	B	A	B
1956–57 and 1957–58.....	19.8	44.5	14.6	30.2	33.9	56.1	9.2	15.8	16.3	26.6
1958–59 and 1959–60.....	22.7	45.6	19.5	35.6	37.6	60.2	14.6	19.3	18.7	26.5
1960–61 and 1961–62.....	24.6	46.7	23.2	36.0	40.3	59.4	17.7	23.5	21.6	29.1

Source: National Education Association biennial reports on Teacher Supply and Demand in Universities, Colleges, and Junior Colleges, 1961–62 and 1962–63, and earlier reports.

Figure 1 shows what the percentages of all new full-time teachers entering college teaching service were in engineering, mathematics, and the physical sciences. The percentage in engineering increased markedly during the first half of the period 1953–54 to 1962–63 and dropped even more markedly thereafter. No doubt the dip was caused by engineering enrollments failing to keep pace with the rising enrollments in higher education as a whole. The physical sciences held rather steady between 8 and 9 percent of all new teachers, while mathematics increased from about 4½ percent at the beginning of the period, to about 6 percent at the end of the period. The increasing enrollments and numbers of degrees in mathematics in recent years were certainly factors in the rise of the percentage in mathematics.

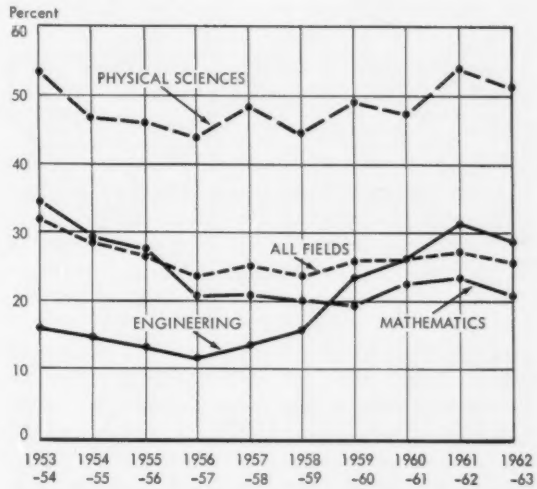
Figure 1.—Percentage of all new full-time teachers in 4-year colleges and universities in engineering, mathematics, and physical sciences.



Degree Qualifications of New College Teachers

Figure 2 shows the percentage of new full-time college teachers having the doctorate and figure 3 the percentage of new full-time college teachers having less than a master's degree.[6] Greatest variations are shown by engineering and mathematics. Over the most recent years the percentage of new full-time college teachers with the doctorate in engineering has increased substantially, while the percentage of those with less than a master's degree has decreased sharply. The increasing number of doctorates in engineering is undoubtedly a factor in these changes. The percentage of new full-time college teachers with the doctorate in mathematics has decreased from about one-third of all new full-time mathematics teachers in 1953–54 to about one-fifth in the years following 1956–57. The number earning doctorates in mathematics has been falling behind the demand more than in any other field.

Figure 2.—Percentage of new full-time teachers in 4-year colleges and universities having the doctorate in engineering, mathematics, physical sciences, and in all fields.

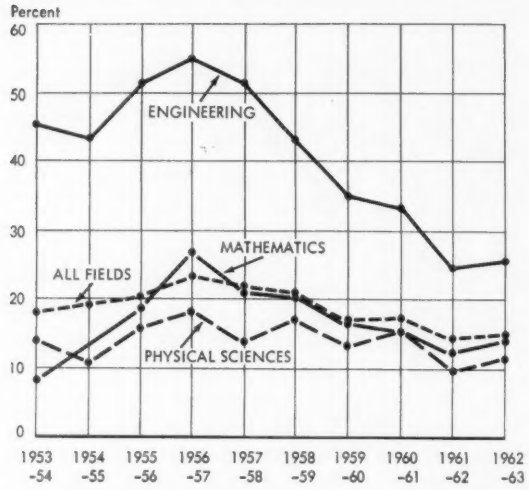


Some Measures of the Demand

One fairly good indication of the demand for college teachers is the number of positions which have remained unfilled for a year or more and for which there was budget to fill them. In 1961–62 and 1962–63, 1,009 institutions reported 168 unfilled positions in mathematics, 236 in the physical sciences and 117 in engineering. Table 5 shows the percentages that positions unfilled in EMP fields were of the total number of unfilled positions in all fields during the applicable years. If we compare the number of unfilled positions to the total numbers of EMP teachers in service, we see that mathematics is the most critical field because the total number

[6] The NEA research reports also provide data on the numbers and percentages of new full-time teachers having master's degrees and those having master's degrees plus 1 year, but these data are not used in this article.

Figure 3.—Percentage of new full-time teachers in 4-year colleges and universities having less than a master's degree in engineering, mathematics, physical sciences, and all fields.



Source: Biennial research reports, *Teacher Supply and Demand*, National Education Association, for the years covered.

of teachers in mathematics is only about half of the total number in engineering or in physical sciences. The percentage that unfilled positions in engineering was of all unfilled positions dropped from 18.9 in 1955–56 or 1956–57 to 9.0 in 1961–62 or 1962–63.

Table 5.—Percentages that positions unfilled (vacant 1 year or more) in EMP fields were of unfilled positions in all fields, in 4-year colleges and universities

Year	Engineering	Mathematics	Physical sciences
1955–56 or 1956–57	18.9	12.4	18.8
1957–58 or 1958–59	13.5	12.7	19.8
1959–60 or 1960–61	10.9	13.9	20.5
1961–62 or 1962–63	9.0	12.9	18.1

Source: Biennial Teacher Supply and Demand college research reports of the National Education Association.

Another indication of the demand for college teachers, particularly the future demand, is the number of officials of reporting institutions who foresaw acute shortage of qualified candidates. In 1961–62 and 1962–63, 488 of 1,009 officials reporting foresaw an acute shortage in mathematics; 369, in physics; and 254, in chemistry. The number (198) in mathematics was also the highest for the 556 junior colleges reporting for these same years.

Women College Teachers

Since discussions of ways of increasing the number of college teachers invariably turn to the possibility of attracting more women, I am including data on women. As table 6 shows, in 1960–61 the percentage of new full-time teachers who were women exceeds the percentage who were already in service in 1954–55 or who received advanced degrees in the EMP fields between 1949–50 and 1959–60. Either the percentage of women is increasing or there is greater job turnover among women than men. It should be noted that the percentages of women in EMP college teaching fields are much smaller than the total percentage of college teachers who are women. It seems, therefore, that some of the shortages which now exist, or which are foreseen for the future, would be lessened if more women could be attracted to advanced study in EMP.

Projected Instructional Staff Increases

The enrollment increases required to fill national needs for persons educated in the sciences during the next decade are likely to require larger percentage

Table 6.—Women in 4-year colleges and universities: Percentage of teachers already in service in 1954–55; of new full-time teachers added from 1954–55 to 1960–61, inclusive; and of recipients of master's and doctor's degrees, 1949–50 through 1959–60

Category	All fields	Engineering	Mathematics	Physical sciences
Teachers in service, 1954–55	21.8	0.5	14.2	6.0
New full-time teachers, 1954–55 to 1960–61	24.1	1.1	17.5	8.9
Recipients of master's and doctor's degrees, 1949–50 through 1959–60	29.3	0.3	16.3	6.7

Source: Teacher Supply and Demand in Colleges, biennial research reports of the National Education Association, and Earned Degrees Conferred reports of the U.S. Office of Education.

increases in instructional staff for science courses than for fields other than science.

According to a recent U.S. Office of Education publication, *Instructional Staff in Institutions of Higher Education, Projected to 1971*,[7] the instructional staff for EMP is likely to be 44 percent higher in 1965–66 and 89 percent higher in 1970–71 than the 1960–61 staff. The staff for fields other than science is expected to increase at a slower rate: 31 percent higher in 1965–66 and 65 percent higher in 1970–71 than it was in 1960–61. Estimates are based upon the assumption that the student-faculty ratio for all fields will increase from 12 to 1 in 1959–60 to 14 to 1 in 1969–70, and that the percentage of total instructional staff employed as part-time instructors, or above, and as junior instructional staff for all fields, will remain constant at the 1959–60 level of 28.5 and 13.6 percent, respectively. It is also assumed that college enrollment will increase from about 3,600,000 in 1960 to about 7 million by 1970. Increases in teachers for EMP will probably average 3,200 full-time equivalents per year over the present decade, increasing from an estimated 36,000 in 1960–61 to a projected 68,000 in 1970–71.

Conclusion

The data of the foregoing discussion indicate that even during the past decade many colleges and universities have found it difficult, particularly in some fields, to employ suitably qualified faculty members. In view of the fact that during this decade the increase in the numbers of students attending college will be almost double the increase during the past decade and in view of the competition for highly trained scientists and engineers by industry and government resulting from our stepped-up programs in space, oceanography, atomic energy, etc., the problem of adequately staffing our colleges and universities will remain, and probably even worsen, during the years immediately ahead. As in past years, college administrators will fill their positions with the best qualified faculty members they can find. But considering the Nation as a whole, the overall quality of college and university faculties, as measured by educational attainment, will not likely improve for some time.

The goals of the President's Science Advisory Committee of increasing the number of doctor's degrees from 3,000 to 7,500 and the number of students who complete a full year of training from 12,000 to 30,000 in EMP fields from 1960 to 1970 will not be realized unless competent faculty are available in sufficient numbers to carry out the necessary instruction. This is the reason why high priority should be given to the problem of increasing the number of college teachers and particularly those individuals who are capable of conducting graduate instruction and directing graduate theses.

The administration's proposal to Congress to increase the number of National Defense Education Act (NDEA) fellowships from 1,500 to 10,000 would be helpful in solving this problem, because this program puts emphasis on careers in college teaching. Moreover, greater effort should be made to influence more women with the proper aptitude for science and engineering to seek careers in these fields. This is feasible since we are doing in this respect less than half as well as the Soviet Union.

Now is the time for action. A crash program initiated late in the 1960's will not suffice, for education is a slow process.

[7] Kenneth A. Simon, *Instructional Staff in Institutions of Higher Education, Projected to 1970–71*, OE–53018, Circular 715, U.S. Government Printing Office, Washington, 1963. 10 cents.

OFFICE OF EDUCATION *Studies* AND *Surveys*

Mathematics, Science, and Engineering Degrees

A RECENT STUDY by Clarence B. Lindquist, specialist for mathematics and physical sciences, Division of Higher Education, presents data on earned degrees in the biological and physical sciences, mathematics, and engineering, and in the specific disciplines within those fields. In order to show trends, the study gives the number of degrees awarded in each discipline annually during the 11-year period from 1949–50 through 1959–60. It also gives the number of doctorate degrees awarded by individual institutions for the period 1949–50 through 1958–59.

Dr. Lindquist's publication, *Degrees in the Biological and Physical Sciences, Mathematics, and Engineering*,

1949–50 Through 1959–60, is available by number (OE–54029) from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20402, for 35 cents.

Increases in Expenditures and Income in U.S. Colleges and Universities

BOTH EXPENDITURES AND INCOME in the Nation's colleges and universities increased by more than one-fourth between fiscal years 1959–60 and 1961–62; current operating expenses rose 26 percent, from $5.628 billion to $7.077 billion, and current income increased about 27 percent, from $5.813 billion to $7.365 billion during the 2 years. These figures are preliminary estimates based on a sample of 392 institutions from the latest Office of Education biennial survey.

During the same period, opening fall enrollment in degree-credit courses rose about 15 percent, from 3.4 million students to 3.9 million. Expenditures for instruction and departmental research continued to increase, reaching $2.2 billion for 1961–62, compared with about $1.8 billion 2 years previously. Another $1.3 billion was spent in organized research, up 30 percent from the $1 billion of 1959–60.

Other statistics from the survey revealed that—

—expenditures for student aid, $236 million, increased more than one-third from 1959–60, but made up only 3.3 percent of the total;

—library expenditures, $180 million, rose by one-third but account for only 2.5 percent of the total expenditures;

—privately controlled institutions spent about 44 percent of the total $7.077 billion—this is the same as the percentage in 1959–60;

—State governments provided the largest single source of current-fund income for colleges and universities in 1961–62, rising 21.4 percent to $1.7 billion. This was almost 23 percent of the total institutional current-fund income;

—revenues from student tuition and fees increased 31.2 percent to $1.5 billion, more than a fifth of all current-fund income;

—the Federal Government increased its contribution 33.4 percent to $1.4 billion, nearly 19 percent of the current-fund income total;

—private gifts and grants totaled $473 million, and income from local governments totaled $189 million, an increase of nearly one-fourth during the 2 years.

International Education

Agency for International Development

Graduate fellowships for Africans

A new fellowship program for Africans has been developed by U.S. graduate schools, the Agency for International Development, and seven African governments. The program, being administered by the African-American Institute in association with the Council of Graduate Schools in the United States, is designed to strengthen the staffs of African universities and civil service.

Twenty-three African students were selected for the pilot program and began work toward advanced degrees in U.S. graduate and professional schools in September.

Future plans for the program include the provision of 25 fellowships to be sponsored by AID and 20 fellowships to be sponsored by a complementary Department of State-UNESCO program. Approximately 60 U.S. graduate schools have offered more than 150 tuition grants in support of the program. These institutions, acting through a Committee of Academic Graduate Deans, made final selection of the 23 African fellows.

AID will sponsor grants in scientific and technical fields and the Department of State-UNESCO fellowships will stress the humanities and social sciences.

Girls' school in Uganda

The Agency for International Development and the University of Massachusetts are supporting the construction of a girls' high school in Uganda. AID will pay for the construction and equipment of the buildings and the salaries of American teachers; the University of Massachusetts will provide persons to write specifications for all equipment; and Uganda will subsidize the tuition for students. The high school will formally open in January 1965, with an enrollment of 420 girls.

Cambodians study in the West

After a semester of English at Georgetown University in Washington, D.C., a group of 39 Cambodian students will study industrial arts at Los Angeles and Long Beach Colleges under the sponsor-

ship of the Agency for International Development. The group is participating in a training program which provides for about 6,000 foreign nationals a year. There are presently 60 Cambodians studying at the two California colleges.

The 39 students will take a full 4-year course leading to a bachelor's degree. Upon returning to Cambodia, they will become faculty members at the new School of Arts and Trades located in the capital city of Phnom Penh.

Special Report on American Studies Abroad

The U.S. Advisory Commission on International Educational and Cultural Affairs, in its second report to the Congress, proposes that binational commissions, which now operate in 44 countries, be established in as many as feasible of the some 70 other countries with which the Department of State conducts exchange programs. The report, prepared by Walter Johnson, professor of American history at the University of Chicago and a member of the Commission, recommends that the commissions in other countries be used to assist the development of American studies overseas as well as the general academic exchange program of the United States.

The commissions have been set up in other countries under authority of the Fulbright Act of 1946. The Fulbright-Hays Act of 1961 authorizes establishment of commissions in all of the countries with which the United States has exchange programs.

Highlights from the Commission's first report, a study of the effectiveness of exchange programs, appear in the July 1963 issue of *Higher Education.*

In the Office of Education

• In September 266 teachers and school administrators from nearly 70 countries began a 6-month visit to the United States under the International Teacher Development Program of the Bureau of International Education. Eleven U.S. colleges and universities are participating in the program by conducting 13-week seminars for the visitors.

• A total of 216 teachers, representing 21 countries, are teaching in U.S. schools during the 1963–64 academic year under the Teacher Exchange Program conducted by the Bureau of International Education. The largest single group, 80 teachers, is from the United Kingdom.

• During fiscal year 1963, the Technical Assistance Branch, Bureau of International Education, supervised 822 participant training programs: Far East, 223; Near East, 135; Africa, 338; Latin America, 110; Europe, 16. In the first quarter 1964, there have been 697 participants: Far East, 223; Near East, 89; Africa, 263; Latin America, 121; and Europe, 1.

OE program notes

National Defense Education Act

Dr. Galbreath resigns from CUA

Effective September 21, Carroll V. Galbreath resigned from his position as Denver regional representative of the Division of College and University Assistance to accept appointment as consultant on student-faculty relationships at the University of the Panjab, Lahore, West Pakistan. In his new position, Dr. Galbreath participates in a program conducted by the University of Chicago under Ford Foundation sponsorship which provides educational advisers to the government of Pakistan to assist in improving its schools. Dr. Galbreath will work closely with the University's officials in student affairs, helping to plan effective use of the building and facilities of a new student-faculty center. A replacement for Dr. Galbreath as CUA representative for D/HEW Region VIII (Denver) has not been selected.

Title VI, language development

The Office of Education recently negotiated 13 contracts with educational institutions under title VI (language development) of the National Defense Education Act. The holders of contracts and their provisions are as follows:

1. San Francisco State College, San Francisco: To prepare a set of instructional materials in the Foochow dialect of the Chinese language for use by adult beginners. The Foochow dialect is spoken in mainland China throughout northern Fukien Province and adjoining areas, including the Nationalist Chinese island of Matsu. Presently there are no adequate materials for teaching Foochow.

Leo Chen, assistant professor of Chinese at San

Francisco State College, is directing the project. It began September 1, 1963, and is to be completed by February 28, 1965, at a cost of $31,847.

2. San Francisco State College: To continue work on a set of instructional materials in Chinese-Mandarin, a language which has captured the interest of students in increasing numbers of high schools over the past 5 years.

Kai-yu Hsu, head of the foreign language department at San Francisco State College, is in charge of the project, which began September 15, 1963, and is to cost $35,479.

3. The University of Chicago: To begin work on a reference grammar of Bengali, a widely used language in both India and Pakistan. At present, there is no adequate grammar of Bengali incorporating comprehensive syntactical data for easy reference by students, teachers, and professional linguists.

Punya Sloka Ray, assistant professor of linguistics at the University of Chicago, is directing the project, which began September 1, 1963. Phase I is to be completed by February 28, 1965, at a cost of $29,531.

4. The University of Chicago: To begin work on a reference grammar of Hindi and Urdu, the official languages of India and Pakistan. The reference grammar will fill one of the major gaps in available materials for teaching these languages.

Norman H. Zide, assistant professor of linguistics at the University of Chicago, is in charge of the project. It began September 1, 1963, and phase I is to be completed by February 28, 1965, at a cost of $37,160.

5. The University of Chicago: To begin a project to study the Dacca and Calcutta dialects of Bengali and to produce teaching materials for the Dacca dialect.

Edward C. Dimock, Jr., associate professor of Bengali and Bengali studies, and [Dr.] Punya Sloka Ray, assistant professor of linguistics, both of the University of Chicago, are jointly directing the project, which began September 1, 1963. The first phase is to be completed by February 28, 1963, at a cost of $29,020.

6. Culver-Stockton College, Canton, Mo.: To conduct research and experimentation designed to improve the teaching of modern foreign languages to undergraduate college students. The project is expected to determine whether the audiolingual approach to foreign language instruction as developed for large institutions of higher education may be applied effectively to the small institution.

John R. Locke, assistant professor of English and modern languages at Culver-Stockton College, is directing the project. The first phase which is supported by this contract began September 1, 1963, and is to be completed in 1 year at a cost of $19,703.

7. The University of Pittsburgh: To investigate and tabulate the expressions and word patterns most frequently used in contemporary spoken German.

Alan Pfeffer, the project's principal investigator, also prepared *A Basic German Word List* and other materials under previous contracts with the Office of Education.

The project began September 1, 1963, and is to cost $39,854.

8. The Hartford Seminary Foundation, Hartford, Conn.: To prepare a dictionary of Sango, a language spoken by about 1 million residents of the Central African Republic and used by that government in communicating with the general population. Currently, the only dictionary for this language consists of 40 pages of French-Sango entries.

William J. Samarin, assistant professor of linguistics at the Hartford Seminary Foundation, is directing the project, which began September 1, 1963, and is to cost $10,095.

9. New York University School of Education, New York City: To conduct research and experimentation to develop procedures for encouraging and systematizing the use of inference and analogy in the learning of foreign languages. This study will investigate the processes through which one learns the meaning of new words and linguistic structures through perception of partial similarities to previously learned expressions.

Aaron S. Carton, assistant professor of education at the New York University School of Education, is in charge of the project. Phase I began September 9, 1963, and is to cost $40,768.

10. Michigan State University, East Lansing, Mich.: To begin work on a dictionary of Krio, a principal language of newly independent Sierra Leone and of neighboring areas on the west coast of Africa. This dictionary, along with a previously compiled grammar, is expected to provide a solid foundation for instruction in a field where there is a great lack of adequate teaching material.

This contract covers the first phase of the project, which includes the transcribing of tapes and surveying of Krio literature as a basis for selecting the entry words. A native speaker of Krio now studying in the United States will assist in developing the dictionary.

Jack Berry, professor of African languages, African Studies Center, Michigan State University, is directing the preparation of the dictionary. Phase I began September 15, 1963, and is to cost $24,724.

11. The University of California, Los Angeles: To prepare a reference grammar of Kabyle, a Berber language spoken chiefly in northern Algeria.

Joseph R. Applegate, assistant professor of Berber languages, Department of Near Eastern and African Languages, UCLA, is in charge of the project. It began September 15, 1963, and is to cost $18,130.

12. The University of Washington, Seattle: To conduct two projects designed to enrich and improve modern foreign language instruction in the United States.

The first study will analyze data on attitudes toward contemporary French culture, gathering the data through questionnaires administered to Americans of diverse occupational backgrounds who have lived in France. The results of this study are expected to help meet the need for improved methods of communicating the essentials of a complex foreign culture to language students.

The contract also provides for the preparation of a supplement to the publication *Research in Language Teaching: An Annotated International Bibliography for 1945–61*, which was developed under a previous U.S. Office of Education contract. The supplement will consist of those additions and corrections needed to bring the original volume completely up to date.

Howard Lee Nostrand, chairman of the Department of Romance Languages and Literature at the University of Washington, is directing the projects, which began September 23, 1963, and are to cost a total of $16,176.

13. The Modern Language Association of America: To conduct two surveys of foreign language study in the Nation's public secondary schools. Both are considered highly important to those concerned with planning the future course of foreign language development at the secondary level.

The first study will analyze nationwide data on 1963–64 foreign language enrollments in secondary schools to be furnished by State foreign language supervisors and directly by schools in those States which do not have a central records system.

The second survey is a pilot study to provide detailed information about the continuity and length of foreign-language sequences completed by the 1963 graduates of 200 high schools.

The entire project began September 23, 1963, and is to cost $67,988. The project director is Donald D. Walsh, Director of the Foreign Language Program of the Modern Language Association, 4 Washington Place, New York 3, N.Y.

Cooperative Research—Deadline Reminder

December 1, 1963, is the closing date for proposals in two cooperative research programs—the curriculum improvement program and the research and development center program.

Proposals should be submitted to the Cooperative Research Branch, U.S. Office of Education, 400 Maryland Avenue SW., Washington, D.C., 20202.

Mathematics Programs

Two bulletins in the Mathematics Programs Series have recently been published by the Division of Higher Education. They are: *Programs of Advanced Standing in Mathematics*, by Clarence B. Lindquist and Jean M. Dickson; and *Honors Programs for Superior Undergraduate Mathematics Students*, also by Dr. Lindquist.

Information for both publications was drawn from a questionnaire, *Survey of Mathematics Programs in Institutions Granting Bachelor and Higher Degrees*, sent out in January of 1961. A complete report of the entire study will be published by the Office. A limited number of free copies of the bulletins are available from the Division of Higher Education upon request.

Specialist for Institutional Information

Richard C. McKee has recently been appointed specialist for institutional information in the Division of Higher Education. In this position Dr. McKee will work with colleges and universities in the identification and in the continuing development of their information programs. Such programs deal with information on tuition, room and board rates, scholarships, work opportunities, and loans.

Dr. McKee comes to the Office from the Department of Education and Psychology at Ball State Teachers College, Muncie, Ind. He has also served as dean of students and director of counseling at Eastern New Mexico State University, and as a counselor in the public schools at Adams City, Colo. Dr. McKee received his Ph. D. degree from the University of Denver. He succeeds Norman C. Crawford, who is now assistant to the provost at the University of Delaware.

Educational TV

As this issue of *Higher Education* goes to press, 35 applications requesting a total of more than $5 million have been accepted for filing under a program of Federal assistance to establish or expand noncommercial educational television broadcast facilities. When an application is accepted for filing, it means the applicant has met initial requirements of application procedures. Such applications are reviewed and evaluated to determine whether and in what amount a grant will be approved.

After an application is accepted, interested persons have 30 days in which to file comments on it. Copies of applications are open to public inspection at the Office of the Director, Educational Television Facilities Program, U.S. Office of Education, Washington, D.C., 20202.

Quality in Education

What are the criteria of quality? What, explicitly, do we propose to improve? How does one best serve those who would like to act but do not know how or to what purpose? A study entitled *What Standards Do We Raise?*, by Winslow R. Hatch, examines critical problems concerning the question of excellence or quality in higher education and proposes 21 standards to help answer the question "What is quality in a college?" The study is a new number in the series *New Dimensions in Higher Education.*

The *New Dimensions* series deals with developments of significance to colleges and universities and all persons interested in improving the quality of higher education. Each number in the series is intended to provide the reader with a summary and interpretation of a substantial body of information. Each number also cites some detailed studies, identifies some additional research needed, and suggests recommendations.

What Standards Do We Raise? (No. 12 in *New Dimensions in Higher Education*) is available by number (OE–53019) from the Superintendent of Documents, U.S. Government Printing Office, 20402, for 15 cents.

Teaching as a Career

A revised edition of *Teaching as a Career*, first published by the Office of Education in 1959, answers many questions that the Office of Education receives concerning opportunities for service in the field of education. It includes recent data on tuition and fee charges at undergraduate institutions, a short bibliography on teaching and advice on such subjects as level of teaching, certification requirements, advancement, salaries, and benefits.

Teaching as a Career is available by number (OE–26014) from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20402, for 20 cents.

McGRATH—*from p. 6*

of the liberal arts college has not dealt directly with one factor which occupies the attention of many administrators in these institutions—that is, financial support. This omission was deliberate. The future of liberal arts colleges will, to be sure, be determined in large measure by their ability to increase their income from student fees, endowments, and personal and corporate gifts. But whether or not these sources of revenue will be adequate to maintain a high quality of liberal education will depend to a considerable degree on the purposes the colleges try to achieve and the efforts they make to operate with maximum efficiency with the resources they already have. Hence, the emphasis here has been on purposes and programs rather than on financial capability.

It would be misleading, however, not to point out that the quality of liberal arts college programs will be determined by their ability to maintain their position in the competition for faculty members. This competition will intensify as student enrollments climb precipitately in the years immediately ahead. A number of studies by Gustad and others have shown that many factors in institutional life

combine to make an appointment attractive, or the reverse. Among these, however, are salaries, teaching load, and opportunities provided for sufficient time to engage in creative scholarship. The college which expects to attract and keep a high-quality faculty will, therefore, have to organize its economy in such a way as to guarantee these satisfactions to its staff.

If, therefore, a liberal arts college wishes not only to survive but to provide a quality program of instruction it will necessarily have to husband its resources and use them wisely in improving the working conditions of staff members. The tendency has unfortunately been to continue uneconomical practices while trying desperately to increase the institution's resources to close ever-widening gaps between income and expenditures. This is a policy which cannot be extended indefinitely, and the colleges ought therefore to begin at once to examine the efficiency of their management practices in relation to their impact on faculty recruitment and development.

Each institution could well afford to examine its curricular offerings in terms of the proper objective of a liberal arts college and eliminate all instruction which, however justifiable on other grounds, is not essential to an undergraduate liberal arts education. It ought also to determine whether its present enrollments are large enough to guarantee an economically as well as educationally defensible program in the upper 2 years. It ought likewise to consider whether the academic calendar should not be extended to cover a larger part of the year. There are other possible sources of economies, but these three could in most colleges be the means of raising salaries from 20 to 33 percent without imposing additional teaching burdens on the faculty and without requiring additional outside resources.

Without intensive study of these potential savings and a consequent improvement of the economic status of the faculty, and of other sources of faculty satisfaction, it is highly doubtful whether the independent liberal arts colleges can continue to occupy their historical position in the company of American institutions of higher education. If they will clarify their purposes and gear their programs consciously to their proper goals, they can expect to provide for thousands of American youth that high quality liberal education which the Nation needs now more than at any time in its history.

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Standard Industrial Classification for Use in Distributive Education. 1963. 12 p. 10 cents. (OE–82013)

State Directors of Junior Colleges and Coordinators of State Systems of 2-year Colleges, Conference Proceedings October 18 and 19, 1961. 1963. 53 p. 40 cents. (OE–57003)

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